

# **PREPRODUCTION INITIATIVE MOBILE OIL EVACUATION SYSTEM COST ANALYSIS**

**PROTOTYPE SITE:** NAB Coronado

**DESCRIPTION:** The mobile oil evacuation system (MOES) is an automated system used to perform engine oil changes on boats such as the rigid hull inflatable boat (RHIB). Conventional engine oil evacuation and delivery requires personnel to use a hand pump to remove the oil from the engines and place it into 5-gallon waste containers. The hand pump is also used to deliver fresh oil back into the engines.

This evaluation examined the feasibility of using the MOES rather than using hand pumps to remove and replace engine oil.

**DATA COLLECTION PERIOD:** May 2002 – May 2003

**COST SAVINGS:** The MOES equipment does not require a hand pump to perform an oil change. Instead, a powered pump evacuates the oil from the engine sump and delivers a measured quantity of fresh oil to the engine via hoses. The time required to perform an oil change using the MOES is significantly less than when using a hand pump, thus creating labor savings. Additionally, the potential for spills is greatly reduced.

**ASSUMPTIONS:** Based on information provided by the site, the following assumptions were made for the purposes of this Cost Analysis:

- For both the previous and current methods, the volume of waste oil evacuated and disposed of and the volume of fresh oil dispensed is the same; thus, these costs were not itemized for this analysis.
- Disposal cost per pound is quoted from the Public Works Center (PWC).
- Based on 5 months of baseline data, the site performs one engine oil change per week.
- It was not possible to calculate the costs involved with disposal of filters that help operate the MOES because the filters are small and the disposal cost would be minimal.

**PREVIOUS METHOD:** Hand pumping engine oil and placing it into containers.

Number of boats per unit:	34
Average number of oil changes per year:	52

## ***Consumables***

There is no cost for new rags since the site receives free recycled rags from the PWC. (Note: Rag costs will differ depending on site situation.)

### ***Labor***

Average labor hours per person per oil change:	6
Average number of personnel per oil change:	2
Average number of man-hours per oil change:	12
Average number of man-hours per year:	624
Average personnel pay rate (per hour) <sup>1</sup> :	\$30.25
Total labor costs per year:	\$18,876.00

### ***Waste Disposal***

Average number of rags disposed per oil change:	10
Average number of rags disposed per year:	520
Weight in pounds of rags disposed per year:	145
Disposal cost per pound of oil rags:	\$0.44
Disposal cost per year:	\$63.80
Total hazardous waste disposal cost per year:	\$63.80

### ***Total Annual Costs***

<u>Item</u>	<u>Cost</u>
Consumables	\$ 0.00
Labor	18,876.00
Waste Disposal	<u>63.80</u>
Total	\$18,939.80

## **PREPRODUCTION METHOD: Mobile Oil Evacuation System (MOES)**

Number of boats per unit:	34
Average number of oil changes per year:	52

### ***Consumables***

Average oil delivery filters replaced per year:	2
Cost of each oil delivery filter:	\$5.00
Cost for oil delivery filters per year:	\$10.00
Average oil mist filters replaced per year:	2
Cost of each oil mist filter:	\$2.50
Cost for oil mist filters per year:	\$5.00
Gallons of gas in MOES gas tank:	4
Average number of times the gas tank is filled per year:	6
Average gallons of gas used to operate MOES per year:	24

Cost of gas per gallon:	\$1.90
Cost of gas per year:	\$45.60
Total consumables per year:	\$60.60

### ***Labor***

Average labor hours per person per oil change:	2
Average number of personnel per oil change:	1
Average number of man-hours per oil change:	2
Average number of man-hours per year:	104
Average personnel pay rate (per hour) <sup>1</sup> :	\$30.25
Total cost for performing oil changes per year:	\$3,146.00

### **Maintenance Labor**

Average labor hours to service MOES per month:	0.5
Average labor hours to service MOES per year:	6
Average personnel pay rate (per hour) <sup>1</sup> :	\$30.25
Total cost for servicing per year:	\$181.50

Average labor minutes to perform preoperational checks on the MOES before each oil change event:	5
Average labor hours to perform preoperational checks on the MOES per year:	4.3
Average personnel pay rate (per hour) <sup>1</sup> :	\$30.25
Total cost for preoperational checks per year:	\$130.08

Total labor costs per year:	\$3,457.58
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### ***Waste Disposal***

Average number of rags disposed per event:	3
Average number of rags disposed per year:	156
Weight in pounds of rags disposed per year:	43.5
Disposal cost per pound of oily rags:	\$0.44
Disposal cost per year:	\$19.14

Total hazardous waste disposal cost per year:	\$19.14
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### ***Total Annual Costs***

<u>Item</u>	<u>Cost</u>
Consumables	\$ 60.60
Labor	3,457.58
Waste Disposal	<u>19.14</u>
Total	\$3,537.32

## **COST ANALYSIS SUMMARY**

### ***Annual Operating Cost***

Conventional method of oil change:	\$18,939.80
Mobile Oil Evacuation System:	\$3,537.32
Operating cost change per year:	\$15,402.48

### ***Initial Procurement***

A.M.O.S. Mobile Oil Evacuation System <sup>2</sup>	\$22,500.00
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***Expected Service Life:*** 10 years

***Return on Investment (per 10-year period):*** \$131,524.80  
(\$18,939.80 x 10) – (22,500.00 + \$3,537.32 x 10)]

***Break-even Point:*** 1.46  
(\$22,500.00/\$15,402.48)

1. This is an average, unburdened enlisted hourly rate for Fiscal Year 2005.
2. Overall project costs totaled \$32,090.00, but data were collected only for usage of the MOES for the RHIBs. The additional equipment costs were for extra items to adapt the MOES to other boats (i.e., LARC and MARK-V).